

**STRATEGIES TO REDUCE INJURIES WITHIN
THE FORT WORTH FIRE DEPARTMENT**

EXECUTIVE PLANNING

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ABSTRACT

In the state of Texas employers, including fire departments, are subject to the rules and guidelines of the Texas Workers' Compensation Commission (TWCC). Regulations promulgated by the TWCC define when an employer has been identified as an extra-hazardous employer. The employer's injury frequencies are compared to the injury frequencies within the employer's Standard Industrial Classification. The Standard Industrial Classifications are established by the federal government to identify industries by type of activity in which they are engaged, and to promote uniformity and comparability of statistical data. If the employer's injury frequencies substantially exceed those that may be reasonably expected for that Standard Industrial Classification, the employer is identified as an extra-hazardous employer. The problem for the Fort Worth Fire Department is that it was identified in a letter from the Texas Workers' Compensation Commission on July 19, 1999 as an extra-hazardous employer. This designation was given as a result of the high number of lost time injuries the department experienced during the audit period of October 1, 1997 through September 30, 1998. As a result of this designation, the City of Fort Worth was confronted with the task of implementing an injury reduction program or face the possibility of being fined by the State of Texas.

The purpose of this study was to analyze the Fort Worth Fire Department's injury history, compare it to the average experience of similar fire departments, and to identify strategies to reduce injuries within the Fort Worth Fire Department. The evaluative research method was employed to conduct this study. Research questions that were to be answered by this study were:

1. What is the current injury experience of the Fort Worth Fire Department?
2. How does Fort Worth's injury experience compare with similar departments?
3. What strategies are employed by other departments to reduce injuries?
4. What strategies could be employed to reduce injuries within the Fort Worth Fire Department?

A literature review was conducted, followed by a survey of 130 fire departments listed in the International Association of Fire Chiefs Metro Section. Results from the survey were tabulated and research was conducted to answer the stated research questions. Research indicated that Fort Worth's injury experience is higher than the average of fire departments of comparable size. It also identified strategies employed by other departments that may provide Fort Worth an opportunity to improve its injury experience. Recommendations resulting from this research included implementing a Root Cause Analysis program to determine injury trends within the Fort Worth Fire Department, establishing a Safety Committee for the department, and conducting further study of successful injury reduction programs in an effort to establish an injury reduction program for the Fort Worth Fire Department.

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INTRODUCTION

It is no secret that fire fighting is one of the most hazardous occupations in the United States today. Firefighters are routinely confronted with physically demanding tasks that must be managed in a hostile work environment. Unfortunately, as many injury surveys have shown, operating in these environments can contribute to injuries and deaths among firefighters. In addition to incident related injuries, firefighters suffer a significant number of injuries while performing routine activities such as physical fitness training, station and equipment maintenance, as well as a number of other non-emergency tasks.

In the state of Texas employers, including fire departments, are subject to the rules and guidelines of the Texas Workers' Compensation Commission (TWCC). Regulations promulgated by the TWCC define when an employer has been identified as an extra-hazardous employer and must conform to the rules of the Extra-Hazardous Employer Program. The purpose of the Extra-Hazardous Employer Program is to provide a safer workplace. In identifying extra-hazardous employers, the TWCC uses injuries resulting in fatalities, occupational diseases, and injuries with eight or more days of lost work time. The employer's injury frequencies are compared to the injury frequencies within the employer's Standard Industrial Classification. The Standard Industrial Classifications are established by the federal government to identify industries by type of activity in which they are engaged, and to promote uniformity and comparability of statistical data. If the employer's injury frequencies substantially exceed those that may

be reasonably expected for that Standard Industrial Classification, the employer is identified as an extra-hazardous employer. The problem for the Fort Worth Fire Department is that it was identified in a letter from the Texas Workers' Compensation Commission on July 19, 1999 as an extra-hazardous employer. This designation was given as a result of the high number of lost time injuries the department experienced during the audit period of October 1, 1997 through September 30, 1998.

The purpose of this study is to analyze the Fort Worth Fire Department's injury history, compare it to injury experiences of similar fire departments, and to identify strategies that may reduce injuries within the Fort Worth Fire Department, thus preventing the department from being designated as an extra-hazardous employer. The evaluative research method is employed to conduct this study. The research questions to be answered by this study are:

1. What is the current injury experience of the Fort Worth Fire Department?
2. How does Fort Worth's injury experience compare with similar departments?
3. What strategies are employed by other departments to reduce injuries?
4. What strategies could be employed to reduce injuries within the Fort Worth Fire Department?

BACKGROUND AND SIGNIFICANCE

The City of Fort Worth encompasses 312 square miles of north central Texas and is populated by 500,00 residents. Fire and emergency medical service for the city is provided by the Fort Worth Fire Department. Additionally, the department is responsible for the city's emergency management function, fire prevention and education programs, arson investigation, bomb disposal, hazardous material response, technical rescue, and emergency marine response. The Fire Department is staffed with 750 uniformed personnel operating 40 fire stations.

In November of 1988 the Texas State Legislature voted to enact the Texas Workers' Compensation Act. This legislation set forth rules for the Texas Workers' Compensation Commission, which has statutory authority over work-related injuries and deaths throughout the State of Texas. The statutory authority granted to the Commission extends to public sector employers as well as private sector employers. Under this Act, the Texas Worker's Compensation Commission is granted the authority to investigate work related death and injuries within the state and has the authority to assess fines to employers who are found to be in violation of the rules and regulations of the commission.

A component of the Texas Workers' Compensation Act is the Extra-Hazardous Employer Program. This program is responsible for identifying extra-hazardous employers based on injuries that result in fatalities, occupational diseases, and injuries

with eight or more days of lost time. The extra-hazardous employer designation is determined by comparing the employer's injury frequencies to that of the injury frequencies within the Standard Industrial Classification. Once an employer has been designated as an extra-hazardous employer, they are required to complete a safety consultation within thirty days, conduct a hazard exposure survey at each work site, prepare a Program Review Report based on the findings of the hazard exposure survey, and prepare an Accident Prevention Plan that addresses each hazardous condition and practice identified within the Program Review Report. Once identified as an extra-hazardous employer, failure on the part of the employer to comply with the Commission's regulations can result in the employer being fined up to five thousand dollars per day.

During the Workers' Compensation Commission's audit period of October 1, 1997 through September 30, 1998, the Fort Worth Fire Department experienced a high number of lost time injuries of greater than eight days. A total of sixty-seven injuries resulted in lost time of more than eight days during that period. As a result of this finding, the Texas Workers' Compensation Commission issued the Fort Worth Fire Department a letter identifying it as an extra-hazardous employer. This designation exposes the Fort Worth Fire Department to a possible fine of five thousand dollars per day as well as other legal liabilities if the department fails to take appropriate action to reduce its lost time injury experience. Additionally, due to minimum staffing requirements, lost time injuries of any length result in greater financial impact on the department's overtime budget.

Preventing future injuries within the Fort Worth Fire Department will require the development of comprehensive injury and accident reduction strategies for the department. The intent of this research is to determine how the Fort Worth Fire Department compares to other departments in frequency of lost time injuries and to explore strategies that may significantly reduce our lost time injury experience. This research is relevant to the Executive Planning course in that it relates to the definition phase of project management as described on pages SM 3-10 and SM 3-11 in the course textbook. Results of this research will yield information that will be useful in defining the purpose and establishing objectives for an injury/accident reduction program for the Fort Worth Fire Department.

LITERATURE REVIEW

Occupational injuries are an important concern for most employers throughout the United States. "Occupational injuries ostensibly account for one-third of all injuries in the United State and one-sixth of all injury fatalities among those 20-64 years of age" (Rubens, Oleckno and Papaeliou, 1995, pg. 151). This concern is of the utmost importance to the fire service as well. "Firefighting is a high-risk, dangerous occupation" (Dunn, 1992, pg. 2). As a result of the risks associated with firefighting, the fire service historically experiences an abnormally high injury rate. "When compared to the data compiled for private industry by the U.S. Bureau of Labor Statistics, the 1996 Fire Fighter Death and Injury Survey indicates the incidence or frequency of fire fighter job related injury is 4.0 times that of workers in private industry" (IAFF, 1996, pg. 5). These

injuries can seriously impact the ability of a fire department to carry out its mission as well as placing a financial burden on the department. Injuries impact worker productivity, overtime costs, and health-care costs. These costs are a concern for all organizations as well as the fire service. “Total national health-care expenditures exceed \$500 billion annually and continue to escalate” (Forrester, Weaver, Brown, Phillips and Hilyer, 1996, pg. 515). One study of the Jackson, Michigan Fire Department indicated that the average cost per reported injury was one thousand seven hundred and twenty dollars (Davis, 1994, pg. 9).

It is an unfortunate fact that a variety of injuries are prevalent in the fire service. “Back injury is one of the most prevalent maladies in the U.S. and is even more common among those who do physical work” (Lowe, 1997, pg. 8). “Due to the inherent dangers of fire fighting, increased age, lower levels of fitness, and a declining number of personnel to do the job, firefighters are at greater risk of back injury than the general population” (Eller, 1995, pg. 5). “Back injury is the number one disabler of firefighters” (Freeman, 1997, pg. 6). “The good news is that the majority of back injuries are preventable” (Waurzyniak, 1997, pg. 41). It is incumbent upon the firefighter to take an active role in back injury prevention. Freeman (1997) contends that “the nature of suppression and emergency medical intervention requires a physical training approach to promote endurance, flexibility, strength and coordination” (pg. 6). Flexibility was sighted as a key factor “in reducing the severity and cost of joint injuries in firefighters” (Hilyer, Brown, Sirles and Peoples, 1990, pg. 631). Other authors suggest a broader approach to preventing back injuries. “Successful prevention programs have four essential parts:

adequate pre employment screening, training in the prevention of back injuries, specific physical strength and agility requirements, and minimizing back-injury hazards in the work environment” (Terribilini and Dernocoeur, 1989, pg. 24).

Another prevalent type of injury in the fire service is heat stress. The drive to create greater and greater protection from external heat sources through the use of full protective gear can potentially place firefighters in the position of suffering heat stress problems on the fire ground. “While strenuous physical activity in hot environments creates problems for the body, there are things you can do to minimize the risk; awareness, fitness and hydration” (O’Conner, 1996, pg. 20).

One of the major challenges facing many fire departments today is how to reduce or eliminate injuries of all types in the workplace. Understanding the impact of injuries on an organization is only part of the process of reducing or eliminating those injuries. Of greater concern may be our approach and our attitude toward the injury problem. “Interventions designed to reduce accidents in organizations have typically been reactive” (Edkins and Pollock, 1996, pg. 83). Edkins and Pollock (1996) go on to suggest that proactive safety is becoming more popular as a means of preventing workplace accidents. In a study of British Rail conducted by Edkins and Pollock (1996), staff attitude, maintenance, and operating equipment were identified as the three most significant problem factors in relation to workplace accidents and injuries. Of these three, “staff attitude was the most frequently sighted problem” (pg. 91). Attitudes of fire service employees may play a major role in the frequency of firefighter injuries. Fire fighting is a

risky occupation and, as such, fire organizations typically hire personnel willing to take risks. Fire service organizations may need to take a closer look at the attitudes of their personnel. “Attitudes that allow for risk taking may still prevail, allowing behavior that will result in injury and possible death” (ISFSI, 1997, pg. 1). Forrester, Weaver, Brown, Phillips and Hilyer (1996) found that “Individuals who participate in a lifestyle that involves frequent risk taking may also continue this pattern at work, possibly bypassing established safety procedures” (pg. 518).

Reducing injuries of risk taking employees is a complicated task, but one proactive approach to the problem may require behavioral modification. “Changing behavior requires understanding the core stresses of the work, then imprinting safe work behavior in the employee’s memory” (Kanner, 1997, pg. 15). Kanner (1997) further suggests that “this is work safety at its most professional level, and is a most cost effective investment” (pg. 15). Whatever the control method employed to reduce injuries, “an attitude of prevention is important to the successful application of controls” (Burton, 1998, pg. 31). “A positive attitude (governed by risk) will lead to behaviors that will help reduce injuries and prevent deaths” (ISFSI, pg. 1).

Most large organizations employ some form of a safety program or accident prevention program to reduce injuries and accidents. “Accident Prevention is a subject that should not be new to any of us. We practice it from the beginning of our existence” (Rounds, 1999, pg. 1). Some research suggests, however, that a key element to a successful safety program is directly related to the level of commitment of the employees.

“Traditional safety programs often depend on rules and the threat of punishment if rules are not followed” (Tyler, 1992, pg. 26). Tyler (1992) goes on to explain that this type of program does not always receive the total commitment of the employee. According to Tyler (1992), “the biggest challenge to safety professionals and managers is in harnessing employee participation and involvement in safety” (pg. 26). An important factor in making a safety program successful is to “make sure your safety programs are viable and realistic” (Swartz, 1992, pg. 31). One strategy to accomplish this is the team concept. Under this concept, “the department determined the need for a program in which employees worked as a team to resolve safety problems; a program with more immediate incentives; a program that would help employees and work groups realize the impact of an individual’s unsafe behavior” (Lanier Jr., 1992, pg. 23). Lanier (1992) also suggests that “the department would benefit from the peer pressure placed on individual members of the work group not to have accidents” (pg. 23).

One fire department that has been successful in changing attitudes and reducing injuries has been the St. Louis Fire Department. Their strategy was “to build a safety attitude in its managers, supervisors, and firefighters. This is accomplished using the three Es of accident prevention: engineering, education, and enforcement” (Schaper and Gerner, 1997, pg. 4). According to Schaper and Gerner (1997), “injuries declined from 1,110 in 1990 to only 377 during fiscal year 1996-1997” (pg. 23). Other fire departments have experienced success in reducing injuries within their departments. In a study of the Las Vegas Fire Department conducted in 1999, results indicated that after implementing

a wellness program, injuries with work days lost were reduced from thirty in 1994 down to five in 1997 (Riddle, 1999, pg. 30).

Physical fitness training as well as other forms of training play an essential role in reducing firefighter injuries. Getting the safety message to the troops is an important role of all firefighters, but, more importantly, of the training division. According to the International Society of Fire Service Instructors (1997), “safety must be built into every training session” (pg. 3). “Training is the backbone of the fire department. It produces a well-prepared force that through repetition increases speed of an operation and enhances proper execution while reducing injuries” (Smith, 1996, pg. 16).

Finally, a reduction in firefighter injuries has a lot to do with firefighter attitude, as well as the level of training individual firefighters and the department as a whole receives. Creating a team approach to the injury problem may be beneficial to the organization’s efforts to create a safer work place. In the end, “World class safety requires unity of purpose, a belief among employees at all levels of the company that the safe way is the right way” (Goetsch, 1998, pg. 27).

PROCEDURES

This research was conducted in Fort Worth, Texas, a city of 500,000 people. The Fort Worth Fire Department is a paid department currently consisting of 750 uniformed personnel. The Fire Department recently experienced a significantly high number of lost time injuries resulting in the department being deemed a hazardous employer according to the Texas Workers' Compensation Commission.

Research began with a literature review conducted at the Learning Resource Center (LRC) at the National Emergency Training Center (NETC) in September of 1999. Further literature reviews were conducted at the Cleburne Public Library in Cleburne, Texas, the Fort Worth Public Library in Fort Worth, Texas, the City of Fort Worth Resource Center, the Fort Worth Fire Department Resource Center, and the International Association of Fire Fighters Local 440 information center.

The literature review focused on identifying injury related issues in the fire service, identifying injury reduction strategies, reviewing injury reduction and safety programs, and determining the impact of injury reduction programs that currently exist. The literature review examined both fire service specific information as well as general information concerning injuries and reduction strategies.

The Risk Management Department of the City of Fort Worth was consulted and an interview with Helen Grulich was conducted on December 4, 1999. The interview

concerned possible strategies to reduce the Fire Department's injury rate. The interview was conducted for one hour, followed by additional phone conversations, and explored a variety of topics including statistics that could be used to analyze the effect of an injury reduction program.

A survey instrument was developed to gather information from other fire departments of similar size (Appendix A). The survey questions were based on information gathered during the literature review and from the interview conducted with Helen Grulich. Information solicited by the survey concerned the existence of an injury reduction program, elements of injury reduction programs, if the program was successful and, if so, why or why not, as well as gathering injury data from 1998 and 1999 for each surveyed department.

The survey was reviewed by the senior policy team members of the Fort Worth Fire Department. After the initial review, the survey was revised based on input received from the initial review process. A final review was conducted and the surveys were mailed to all departments listed in the International Association of Fire Chiefs Metro Section. One hundred and thirty surveys were mailed, of which ninety-seven were returned. The data from the survey was analyzed to determine what information would be useful in developing an injury reduction program for the Fort Worth Fire Department.

Guided by the survey results, information was gathered in February 2000 from the City of Fort Worth Budget Office, City of Fort Worth Risk Management Department,

Fort Worth Fire Department Health and Safety Officer, and the Huguley Fitness Assessment Lab. The purpose of this information was to evaluate the Fort Worth injury data and current safety program in accordance with the information gathered through the literature review and from the survey. Information concerning workers' comp cost, number of lost time injuries, and related costs were compiled and analyzed to identify strategies for reducing injuries within the Fort Worth Fire Department.

RESULTS

1. What is the current injury experience of the Fort Worth Fire Department?

Examination of Fort Worth Fire Department injury reports indicates that the department experienced a significant number of injuries in both 1998 and 1999. Research results indicate that the department experienced three hundred and sixty eight total reported injuries in 1998. Of those injuries, eighty-three resulted in lost time to the employee. Three hundred thirty-four of all injuries reported that year were incident related. In 1999 the department experienced two hundred eighty six total reported injuries. Of those injuries, seventy resulted in loss time to the employee. One hundred thirteen of all injuries in 1999 were incident related.

2. How does Fort Worth's injury experience compare with similar departments?

An external survey was conducted of the IAFC Metro Section Fire Departments (Appendix A) to compare injury statistics of departments similar in size to the injury statistics of the Fort Worth Fire Department.

TABLE 1.

Total Injuries

	1998	1999
Average of Surveyed Departments	258	225
Fort Worth	368	286

Study of total injuries experienced by all surveyed departments indicated that the average number of total injuries for those departments was two hundred fifty eight in 1998 (Table 1). The Fort Worth Fire Department experienced three hundred sixty eight injuries during that same period. Fort Worth's statistics indicate an injury experience forty three percent higher than the average of all surveyed departments in 1998. In 1999 the average total injury experience of all surveyed departments was two hundred twenty five. Fort Worth's experience for the same period was two hundred eighty six, an injury experience twenty seven percent higher than the average of all surveyed departments.

TABLE 2.**Lost Time Injuries**

	1998	1999
Average of Surveyed Departments	118	87
Fort Worth	83	70

Study of lost time injuries indicates that lost time injury experience for the average of all surveyed departments was one hundred eighteen in 1998 (Table 2). There were eighty-three lost time injuries experienced by the Fort Worth Fire Department that year. Fort Worth's lost time injury experience for 1998 was thirty percent less than the average of all surveyed departments. In 1999 the average lost time injury experience for all surveyed departments was eighty-seven. Fort Worth's lost time injury experience for that same period was seventy, twenty percent less than all surveyed departments.

TABLE 3.**Incident Related Injuries**

	1998	1999
Average of Surveyed Departments	140	141
Fort Worth	334	113

Of all injuries reported in 1998, research indicated that there was an average of one hundred forty incident related injuries among the surveyed departments (Table 3). The Fort Worth Fire Department experienced three hundred thirty-four incident related injuries in 1998. Fort Worth's incident related injury rate was one hundred thirty-nine percent higher than that of the surveyed departments. In 1999 incident related injuries for

the surveyed departments were one hundred forty-one while Fort Worth's incident related injuries had dropped to one hundred thirteen. Research indicates that Fort Worth's incident related injuries had decreased by sixty-six percent from 1998 to 1999.

3. What strategies are employed by other departments to reduce injuries?

Survey results indicate a variety of strategies used by other departments to reduce injuries. Ninety-three percent of all survey respondents indicated that their department was engaged in a formal injury or accident reduction program. Of those departments engaged in formal programs, they identified a variety of program elements.

TABLE 4.

**Elements of Injury/Accident Prevention Programs
By Percentage of Survey Respondents**

Element	% of Respondents
Occupational Safety Officer	80%
Safety Committee	84%
Accident Review Board	71%
Formal Safety Meetings	67%
Root Cause Analysis System	29%
Written Safety/Accident/Injury Reduction Policy	60%
Station and Facility Safety Inspections	76%

Survey results indicated that eighty percent of all respondents had a dedicated Safety Officer Program (Table 4). Eighty-four percent indicated that their department had established a safety committee, while seventy-one percent indicated that their department

had implemented an accident review board. Sixty-seven percent of all respondents indicated that they conduct formal safety meetings with their personnel, while only twenty-nine percent indicated that they utilize root cause analysis as an element of their injury reduction program. Sixty percent of all respondents indicated that their department has a written safety policy, while seventy-six percent conduct station and facility inspections as part of their injury reduction program. Of all respondents who indicated that they have a formal injury reduction program, seventy-eight percent indicated that their program was successful. Three percent indicated that their program was not successful, while nineteen percent of the respondents had not determined if their program was successful. An unexpected result that was identified in the survey was that eleven percent of all respondents reported that their injury experience had been adversely impacted by physical fitness related activities. Indications were that this type of injury could be reduced through a program to train personnel in proper lifting and exercise techniques.

4. What strategies could be employed to reduce injuries within the Fort Worth Fire Department?

Based on Fort Worth's current injury experience, it is apparent that current safety measures can be improved upon. Survey results indicate that seventy-eight percent of those departments with a formal injury reduction program considered their program successful. Nineteen percent of those departments were inconclusive about the success of their program, while three percent indicated that

their program was unsuccessful. Research indicates that implementing a Root Cause Analysis Program would be beneficial to the department by helping identify the root causes of our injuries. In addition to root cause analysis, it appears that a safety committee could be established to improve management of the overall safety program and to gain employee participation in the safety program. Eighty-four percent of all surveyed respondents indicated that they utilized a safety committee. Another promising strategy is the station and facility inspections conducted by many respondents. Fort Worth has not conducted safety inspections at its facilities in a number of years. This strategy may be successful in identifying potential safety hazards, thus reducing the high number of injuries that occur at the stations.

Investing in a personal trainer program to educate the workforce in proper training techniques may be beneficial in reducing physical fitness related injuries. Many surveyed respondents indicated that improper physical fitness training led to injuries.

Fort Worth's incident related injuries are of particular concern. In 1998 incident related injuries reported by the Fort Worth Fire Department exceeded the survey average by one hundred thirty-nine percent. To address the issue of incident related injuries, it may be beneficial to the department to reestablish its Safety Officer Program. Eighty percent of all surveyed respondents indicated using an Occupational Safety Officer.

DISCUSSION

“Firefighting is a high-risk, dangerous occupation” (Dunn, 1992). Being a high-risk occupation, one would naturally expect a correspondingly high injury experience. In the case of the Fort Worth Fire Department, though, its injury experience has exceeded the industry norm. Research indicates that Fort Worth’s total injuries exceeded the average of the surveyed departments by forty-three percent in 1998, and by twenty seven percent in 1999. As a result of this abnormal injury experience, the City of Fort Worth finds itself facing the possibility of substantial fines if the fire department does not reduce its injuries. The State of Texas has issued the City of Fort Worth a clear warning to bring down the number of injuries or face a five thousand-dollar per day fine. However, there are other reasons to be concerned as well.

Injuries can seriously impact the ability of a fire department to carry out its mission, as well as placing a financial burden upon the department. When a firefighter is off work due to injury, the department many times must replace that employee using overtime. Escalating overtime cost can become a significant problem for many departments. In 1999 alone, the Fort Worth Fire Department exceeded its overtime budget by two million dollars. Along with overtime costs, injuries can contribute to rising healthcare costs. “Total national health-care expenditures exceed \$500 billion annually and continue to escalate” (Forrester, Weaver, Brown, Phillips and Hilyer, 1996). A study of the Jackson, Michigan Fire Department indicated that the average cost per reported injury was one thousand seven hundred twenty dollars (Davis, 1994). The City of Fort

Worth has experienced both escalating overtime costs and increasing healthcare costs due in part to its injury experience. These costs ultimately are passed on to our customers, the taxpayers.

In light of these facts it becomes obvious that the fire service should expend a considerable amount of energy in an attempt to reduce injuries. Many departments have been successful in reducing injuries by implementing formal injury reduction programs. St. Louis is a good example of such a program. Their strategy was “to build a safety attitude in its managers, supervisors, and firefighters” (Schaper and Gerner, 1997). Comments made during the survey process indicated that the positive attitudes of employees towards safety were crucial elements in a successful program. According to Tyler (1992) “the biggest challenge to safety professionals and managers is in harnessing employee participation and involvement in safety”. Survey results indicate that eighty-four percent of all surveyed departments utilized a safety committee in an attempt to gain employee participation. Another sixty-seven percent of all respondents indicated that they conducted formal safety meetings with employees to increase participation in safety programs.

The fire service, by its nature, is a hazardous profession. It is doubtful that we will ever eliminate all risk of injury from firefighting but we can do more to reduce both the frequency and severity of those injuries that do occur. While the Fort Worth Fire Department has experienced a high frequency of injuries, there appears to be viable strategies that can be employed to reduce those numbers. While only twenty-nine percent

of surveyed respondents indicated Root Cause Analysis as part of their injury reduction program, it would appear that determining the cause or causes of injuries would be the most logical starting point of any program. Root Cause Analysis would be of particular value when trying to determine trends in a given department's injury experience.

Another key element of a successful program appears to be the participation of all employees. The implications of this research are clear. The Fort Worth Fire Department must implement new strategies to reduce the number of injuries it experiences each year. Several strategies have been analyzed during this study. Of utmost importance, though, is the attitude of the employee. It is a major factor in reducing the number of injuries. Cultivating positive attitudes towards safety can result in a reduction in injury frequency. Many of the elements identified in this research as contributing to a successful program center around employee participation and buy in. Creating a team approach to the injury problem would be beneficial to the organization's efforts to create a safer work place. In the end, "World class safety requires unity of purpose, a belief among employees at all levels of the company that the safe way is the right way" (Goetsch, 1998).

RECOMMENDATIONS

Historically the Fort Worth Fire Department has experienced a high injury rate. Many departments throughout the United States have had experiences similar to the Fort Worth Fire Department. Many of these departments have been successful in reducing the number and severity of injuries by implementing injury reduction programs. Research has

shown that many elements of these programs may be applicable to the Fort Worth injury problem. Based on the information gathered through this study, the following recommendations should be pursued by the Fort Worth Fire Department.

1. Identifying the root cause of injuries is of the utmost importance for the Fort Worth Fire Department. It is difficult to create a successful injury reduction program without first understanding the type and cause of our injuries. It is recommended that the department establish a Root Cause Analysis Program to identify injury trends.
2. Employees buy in and participation are crucial if an injury reduction program is going to be successful. It is recommended that the Fort Worth Fire Department establish a safety committee comprised of employees from all levels of the organization to manage the department's safety program.
3. Successful safety programs are comprised of many different elements. It is recommended that the Fort Worth Fire Department conduct further studies of successful programs in an effort to develop its own successful program.

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Appendices Not Included. Please visit the Learning Resource Center on the Web at <http://www.lrc.fema.gov/> to learn how to obtain this report in its entirety through Interlibrary Loan.